

State of Maryland
Board of Natural Resources

**Maryland Forests
and
Forestry**
A Manual of Source Material

Prepared by
FINDLEY BURNS
*Department of
State Forests and Parks*



May, 1948
Educational Series No. ■ 17

Department of Research and Education
SOLOMONS ISLAND, MARYLAND

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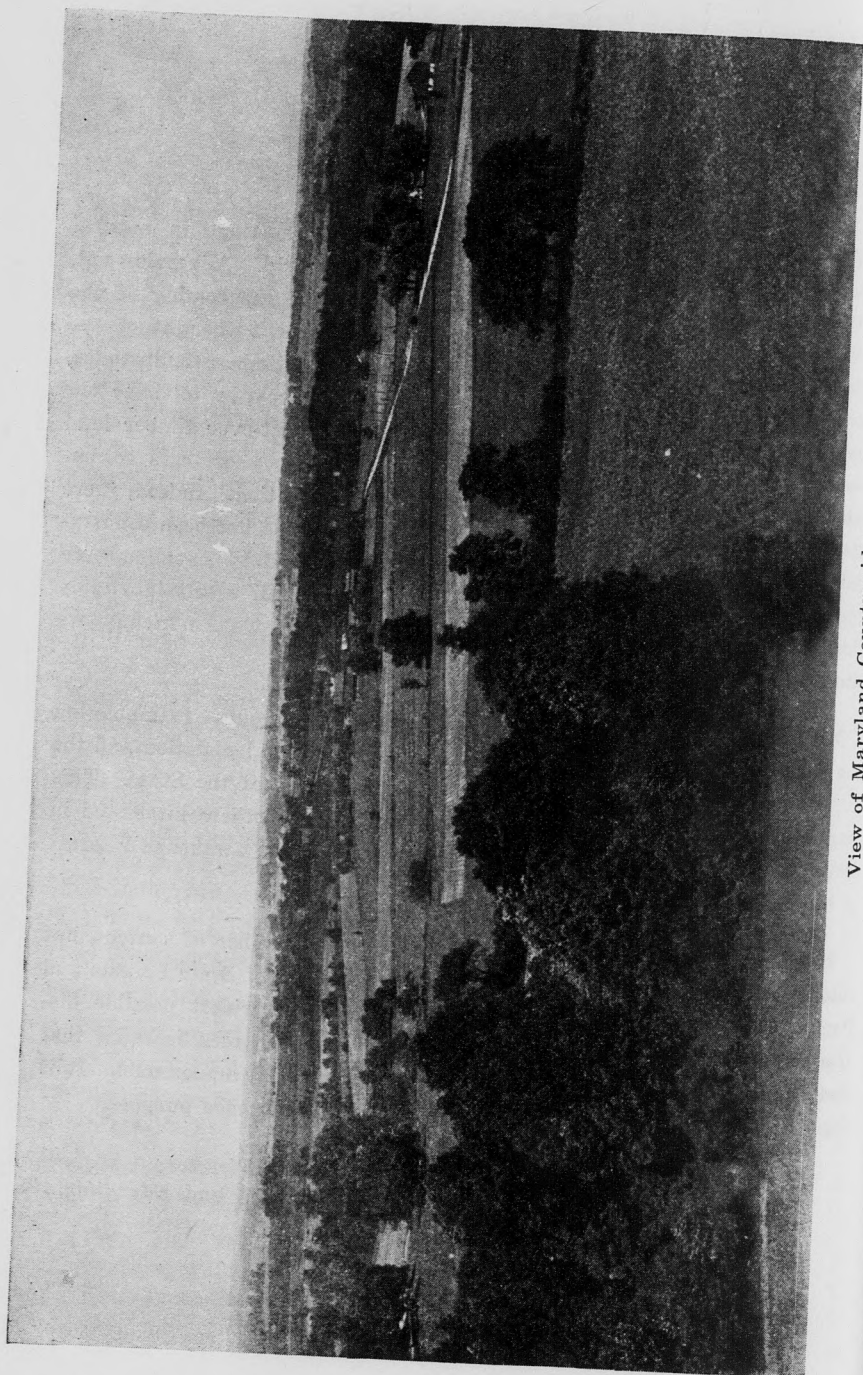
FOREWORD

Americans have been more wasteful of a great heritage in natural resources than perhaps any other nation in the world. Minerals, soil, water, fish and other assets that abounded here with the coming of the settlers have been wasted, virtually squandered, without thought of the future. Many hundreds of thousands of acres of virgin timber, for instance, have been destroyed merely to get them out of the way, or to drive out pests, or to make available added farm land, while cut-over timber land has been left denuded and exhausted with its future usefulness so impaired as to take decades on end to accomplish restoration. Indeed, there has been little thought of repletion at all. This situation has been country-wide and the practices referred to have been employed by so-called "big interests" and by the "little man" alike. The overall result inevitably has been to make of us the timber poor people that we Americans, we Marylanders, are today.

Marylanders have begun to recognize that a wiser course in managing the forests must be pursued, thus the recent progressive legislation and the initiation of the Forest Conservancy District program of the State. This manual, intended for the use of teachers, writers and others interested in forest conservation is, within itself, an indication of an awakened interest in the subject.

The material presented herein is derived from a number of sources, but chiefly from original data gathered by the Department of State Forests and Parks. There is no question as to the need of the widest possible dissemination of facts in regard to the State's forest resources, in order that their importance to the public may be the more readily understood. It is hoped that the information here given will serve its intended purpose.

R. V. TRUITT, *Director,*
Department of Research and Education.



View of Maryland Countryside.

IT CAN HAPPEN HERE

Buried in the dust and rubble of ages, along ancient migration lanes, are crumbled palaces of kings and buried cities which once housed thriving populations. Fabled lands "flowing with milk and honey," Babylon, Assyria, Persia and the valleys of the Tigris, Euphrates and Ganges were not always the wastes they are today. And Egypt, a country about as big as France and Italy put together, once almost incredibly rich in natural resources, is now only three per cent arable. The rest is desert.

The mysterious city of Timbukto, a ghost town of prehistoric origin in the Sahara Desert, was once surrounded by fertile fields and orange and olive groves. Buried beneath its sands is complete evidence that Africa's great "dust bowl" area once was as rich as the Mississippi Valley. Forests, lakes, and rivers spread across what are now the Sahara wastes. What has wrought the change? The progressive destruction, through centuries, of those natural resources that alone make our world a fit place in which to live.

We who inherited this continent of America, the richest prize in all history, fell heir to a hundred million years of cumulative transformation of raw volcanic rock to rich loam, grassy plains, primeval forests, a myriad population of fur-bearing animals, and waters teeming with fish and other aquatic life.

Productivity of soil is the bottle-neck of human existence. History is one continuous succession of migrations from exhausted soil to new and fertile fields. How long such fields remain fertile is measured by the manner in which man handles the natural resources he finds there. And nowhere else on earth has he wreaked so much destruction in so short a time as in this America of ours.

But how can this be? No disaster can happen here. We have been taught that our natural resources are inexhaustible, that America can feed the world!

Let anyone who believes this ask himself the following questions:

Why are so many of our fresh water springs, once constantly flowing, now dry?

Why are our forests, which should serve as an ever-renewable source of natural wealth, today so unproductive?

Why do streams which within our memory flowed full the year round now dwindle to nothing in midsummer?

What has made great stretches of western grasslands, one of the world's greatest sources of livestock forage, barren deserts?

What has become of the rich topsoil washed off so many Maryland farms?

Why do lakes which once had crystal clear waters and an abundance of aquatic resources now grow green scum and no fish?

What has become of the millions of people who once lived on the now denuded forests, abandoned farms, and exhausted fishing waters?

Why are there in Maryland more than 400,000 acres of waste land, once productive, but now an ever-growing sore on the State economy?

Yes, it can happen here! For these things are symptoms of a disease which, if permitted to go unchecked, surely and inevitably will bring this nation low. The fertile soils, the sparkling waters, the abundant growth of woody vegetation, the minerals, the wild-life that are our natural heritage, are not inexhaustible. Properly handled, they can be made to last indefinitely and produce abundantly. But let them be depleted by waste and mismanagement, and our nation will be broken out with a rash that no sociological salve or other cooked-up remedy can cure. No temporary expedient will restore the soils we have depleted through improper farming methods, the forests we have destroyed by reckless lumbering and fire, or the waters we have polluted or caused to run dry.

Yet this destruction can be stopped short—if taken in time. Scientists assure us that, by prompt action, soils, vegetation, and ground water tables can be made to persist indefinitely and yield a balanced production of life's necessities. It appears that the place where our future citizens should be prepared for and dedicated to this task is in the schools.

FOREST VALUES

Timber Production

The forest serves more useful purposes than most of America's natural resources. First and foremost, it provides us with a source of timber supply—and of all our raw materials timber is among the most important. The forest gives us our cheapest and most easily worked building material. More American houses are built of wood than of brick, tile, stone, steel, and concrete combined, a situation that promises to continue for a long time to come. It gives us furniture

of all kinds, expensive and inexpensive. It gives us the wood-pulp paper on which our newspapers and many of our books are printed, and the bags in which we carry home the family marketing. It gives us the fiberboard containers and the wooden boxes and crates in which practically all of our consumer goods and heavy manufactured articles are shipped.

The forest annually supplies us with millions of wooden ties for our railroads, and more millions of wooden poles for the telephone and telegraph lines that span the continent. It gives us the fuelwood that heats hundreds of thousands of American rural homes, and the fire-place fuel for our city houses. Our mines use great quantities of wooden props, and wooden piling is in demand along our coasts and bays.

Wood is the greatest natural source of cellulose. Cellulose forms the basis of such modern materials as cellophane, and the even more recent plastics, which we are told will serve in the post-war world a great number of uses hitherto given over to metals. In any evaluation of the forest as an economic factor, therefore, account must be taken of its potentialities as a source of basic cellulose for manufacturing industries now hardly more than in the formative stage. Another fact to consider in this connection is that, in the extraction of cellulose from wood, forest material can be utilized that otherwise might be classed as waste, or serve perhaps only for fuelwood. This means added commercial value for the forest as a whole, the component parts of which are, first, sawtimber—trees that are sawed into boards or dimension material, and, second, one or more of the other products previously enumerated.

In the last few years, research laboratories have transformed wood into probably the most versatile of raw materials. Chemically-treated, heat-stabilized, high-density products made by compressing either solid wood or layers of thin veneers, such as "compreg" and "staypack," transform ordinary wood into a substance of exceptional hardness, and one without any tendency to swell and shrink, while resistant to moisture, chemicals, insects and decay (the last in the case of compreg only; staypack must be painted for out-door use; but, to compensate, is twice as tough as compreg). Staypack and compreg, considered either separately or together, enable the wood of common species, such as cottonwood, willow, and white fir, to take on strength, hardness, and a rich, dark color like that of an aristocratic cabinet wood.

Another laboratory advance is the successful impregnation of wood with resin-forming chemicals. The result is a product that retains all the appearance of wood, but with its original structure materially changed. It is considerably harder than ordinary wood, and has a somewhat glossy finish. Since all cells are penetrated by chemically produced resins, the new wood is practically immune to the absorption of moisture, and will neither swell nor shrink. Experiments have shown it to be highly resistant to fire. Termites and other wood-boring insects will not attack it. To obtain an indestructible paint job, all that is necessary is to mix the proper color with the resins before the wood is treated. This finish will neither weather nor wear off. In the main, resin-treated wood is meant to serve the same purposes as are now served by ordinary wood, especially in construction.

The technique of laminated wood, in which the synthetic glues used are actually stronger than the wood itself, has progressed to a point where this material may serve as structural members for buildings of practically any size. The Greyhound bus terminal in Baltimore is an example of laminated wooden arch construction, as are the giant hangars for Navy blimps along our coasts.

An important thing to remember about our forests as a source of timber supply is that, if rightly managed, they are self-renewable. Once the last shovelfull of coal or ore is taken from a mine, that mine ceases to exist as a natural resource. It will not replace itself, nor can man replace it. It is gone for good. The forest, on the other hand, by natural growth, is able to renew itself indefinitely—if given a chance. Why our Maryland forests have not hertofore been given this chance is set forth on page 14. What steps have been taken to meet the situation will be found on pages 27, 30 and 37.

Watershed Protection

Tree growth is the best watershed cover known. It is the best because it is the most absorbent. Floods occur when, in periods of heavy rain, the excess precipitation runs off the watersheds directly into the streams, without first passing through the ground and into the springs that ordinarily feed them. To the extent that watersheds are bare or are provided with a protective cover, floods are either severe or moderate.

The function of the forest as a protective cover begins with the tree crowns. These break the force of the rain before it reaches the ground. Anyone who has been in the woods after a rain knows that the trees

continue to drip water for a considerable time after the rain has ceased. This means that just so much water is held back until the ground is in a condition to absorb it.

Most important of all, however, is the forest floor of fallen leaves and other decayed vegetation, the humus and duff, often a foot or more in thickness, that serves as a vast sponge to absorb the rainfall and feed it gradually to the springs. Investigation has shown that, on the average, the forest floor can, per unit of volume, absorb and hold an amount of water equivalent to two to four times its own weight. The protective influence of the forest extends from tree crowns to roots, for these latter form arteries along which water can percolate into the soil. However, it should be said that the forest cover does not prevent floods, although it tempers their intensity. Actually it does more than that. As rainfall is abundant or scarce, Maryland streams rise and fall. Sharp fluctuations in streamflow are the bane of city water systems, hydro-electric plants, and all other industries which rely upon water-power for their operation.

Severe flood conditions, fortunately, are of relatively infrequent occurrence, though more frequent than they should be. Dry spells, on the other hand, in the course of which streamflow drops alarmingly, are not at all uncommon. In times of normal rainfall, the forest cover acts as a storage reservoir from which the streams receive a supply of water when natural precipitation fails. The tendency in such cases is for the forest to ensure a relatively even streamflow throughout the year. As watershed cover, then, the forest serves a two-fold purpose—to lessen the danger of severe floods and to regulate streamflow. Each function is of unmistakable importance in our State and national economy.

Influence Upon Ground Water Level

The ground water level in Maryland, that is, the level which determines whether wells will flow or run dry, has, in the last several decades, fallen anywhere from 15 to 25 feet. In many parts of the State, especially in the manufacturing area which surrounds Baltimore, the situation is critical. Water is essential in industry, as it is in the home. The problem is now under intensive study by the Maryland Department of Geology, Mines and Water Resources, and in due time results will be made available to those interested. This much, however, can be indicated. It is reasonable to assume that, had the 400,000 acres of waste land in the State, now barren, or relatively so, been

covered by vegetation and more wisely used, the water level would not have dropped as it has. The presence of woodland not only ensures that the greatest amount of rain water enters the soil, but it provides the shade necessary to keep surface evaporation at a minimum. And in this connection it should be remembered that the amount of waste land in Maryland grows year by year just to the extent that antiquated farming methods continue and woodlands are destructively logged. Destruction is cumulative with the years.

Erosion Control

Waste lands and improperly farmed lands are prolific sources of silt. They represent grand scale erosion. From bare slopes or those planted to field crops under antiquated methods the soil moves rapidly, often to destroy the fertility of richer lands below on its way to the sea. Once in the streams, the lost top soil, relatively the most fertile, becomes the silt that chokes our waterways, our harbors and the Chesapeake Bay itself. Rather than attack the problem at its source, we annually spend millions of dollars in dredging operations.

Fertility of the soil can be maintained only when it passes to the sea at a rate no greater than that at which it is restored by the decay of materials upon which it rests. Under the pull of gravitation and the beat of sun, wind, and rain, soil is forever on the move. Beneath a cover of woody growth, however, it moves so slowly that the ever-acting forces of soil formation balance, or even more than balance, the losses. The problem in Maryland is to obtain a proper balance between cleared land and forested land. We do not have it now. To rectify the situation, areas at present denuded, or nearly so, must be planted to tree growth by private landowners on a considerable scale. This will take time and cost money, just as it always takes time and money to correct past errors. If commercially valuable tree species are planted, however, the work of reforestation will, sooner or later, more than pay for itself, and man-made sores with which we are all too often confronted will have been removed.

Recreation

The forest offers opportunities for almost every form of outdoor recreation—fishing, hunting, camping and hiking, together with rest and relaxation. The quiet and beauty of the woods appeal to people in every walk of life and of every social level. No estimate of what the forest contributes to the public welfare would be complete without

consideration of its recreational potentialities. Open-air recreation is a public need and the contribution made by the forest to this end, though not to be measured in dollars and cents, is none the less real. See pages 43 and 45.

Wild Life Protection

It is in the forest that most wild life finds a haven and a home. In Maryland woods rabbit, squirrel, raccoon, opossum, fox, deer, grouse, pheasant and turkey find food and shelter and the opportunity to multiply. In their spring and fall flights, wild ducks and geese alight on forest lakes and water courses to rest and feed. Trout and other game fish inhabit the cool, clear woodland streams.

In the State Forests, in cooperation with the Department of Game and Inland Fish, there have been set aside a number of areas of from 150 to several thousand acres to serve as game refuges. In these, small patches are plowed and planted to grain. On certain other areas without merchantable timber, original ground cover has been replaced by sprout growth and herbaceous vegetation as browse for rabbits and deer, and as food for grouse. Elsewhere in the State Forests hunting is permitted in season, and the policy is to develop to the fullest the opportunities for sport these areas offer the hunter and fisherman.

Regulations established by the Commission of State Forests and Parks provide for means of wild life conservation on privately owned timberlands after lumbering operations.

A post-war project sponsored by the Department of State Forests and Parks and a number of sportmen's organizations deserves mention here. This is the establishment, by purchase, gift, or cooperative agreement, of "ribbon forests," not less than 300 feet in width, along both sides of many Maryland streams. The object here is three-fold. First, to provide the shade needed to ensure cool waters for game fish. Second, to prevent bank erosion, which, for many a fisherman, has spoiled an otherwise promising stream. Third, to provide recreation grounds to which fish-minded families may repair on week-ends with reasonable assurance that they will not return empty-handed. It is planned eventually to establish ribbon forests along some 800 miles of the State's inland fishing waters.

MARYLAND FORESTS TODAY

Condition

At the time the first settlers came to Maryland, about 90 per cent of the state's land area of 6,325,000 acres was covered by virgin forests, composed of a great variety of tree species, but of three general types—the pine and swamp hardwood type of the coastal plain, the mixed hardwood type of the central Piedmont plateau section, and the white pine, hemlock, and hardwood type of the mountainous western portion of the State. Though the virgin forest is a matter of history, these types persist in our present-day woodlands.

It was necessary, of course, to clear large areas of forest land for agriculture, and when a more or less final balance was struck between cleared land and woodland, there remained of the latter perhaps 2,500,000 acres. The manner in which this timbered area has been exploited commercially is reflected in the condition of Maryland's forests today.

The history of lumbering in Maryland can be summed up very briefly—reckless cutting, wasteful logging, followed by destructive fires. As a result, what we now have in most cases is relatively thin stands of second growth, or even third growth, much of it of indifferent quality. Each successive cut into our forest capital has resulted in smaller timber and less valuable re-growth. Probably not more than 13 per cent of our present woodlands can be classified as saw-timber areas, while some 53 per cent produce nothing better than cord-wood. The remaining areas, or 34 per cent, are either restocking to tree growth, though not always satisfactorily, or else have been so badly denuded of such growth as to constitute wasteland. Destructive lumbering and poor farming methods together are responsible for the 400,000 acres or more of wasteland now within the borders of the State.

In a preceding paragraph, mention was made of "a more or less final balance" between waste land and cleared land in Maryland. The term "more or less" was employed because there is in fact no such final balance. The relative proportion of cleared land to woodland undergoes constant change. For example, the Department of State Forests

and Parks estimated in 1918 the State's wooded area to be 2,223,000 acres. A survey made in 1945, based on aerial maps, places the wooded area at something like 2,700,000 acres, an apparent increase in 37 years of approximately 524,000 acres. This increase can be attributed largely to the return of worn-out farm land to tree growth.

The important thing, however, is not so much the current acreage of woodland, but its productiveness in terms of timber growth. Here the picture is anything but satisfactory. Present day Maryland forests, it is estimated, produce each year approximately 29 cubic feet of timber per acre. Actually, under proper management and in course of time, they are capable of producing 71 cubic feet per acre, or considerably more than twice the present figure. Besides this, there occurs a depletion of the State's forest capital from which is taken every year an average of 15 per cent in excess of annual growth. This figure is for the decade before World War II. During the war years, the capital drain was appreciably greater.

It should be emphasized here that by far the greatest part of our present timberland is fit only for tree growth. If it is not made to produce wood, it will produce nothing of value. It should be the goal of every community, every county, every state, and every nation to have the greatest possible proportion of its land productive. We like to think of America as a great industrial nation. Yet without the products of its fields, its forests, and its mines, not a wheel would turn in all the country. To maintain industrial leadership or even to continue to exist as a nation, these natural resources must be conserved through wise use. In that, and in that alone, long time survival is possible.

Present Value in Dollars and Cents

Despite the misuse to which they have been subjected, forests remain the State's greatest renewable natural resource. Spread over approximately one-third of its land area, Maryland has a timber stand conservatively estimated, in terms of stumpage value, to be worth \$50,000,000. In 1941, the lumber harvested from it, as reported by the United States Forest Service, brought in a total of \$3,804,000. Fuelwood, mine props, pulpwood, and other products of the forest sold for \$5,019,000, or a grand total of \$8,823,000. Below are listed production figures and money values for all Maryland forest products in the year 1941.

The following list gives a good idea of the variety of products taken from Maryland forests.

Commodity	Unit	Quantity	Value at Mill or Point of Production
Lumber	Board Feet	160,040,000	\$3,804,000
Fuelwood	Cords	458,000	2,060,000
Poles and Piling	Number	309,000	1,389,000
Farm Timbers	Board Feet	20,805,000	499,000
Fence Posts	Number	1,665,000	250,000
Holly Wreaths	Number	875,000	175,000
Holly, Loose	Crates	50,000	175,000
Mine Timbers	Number	2,240,000	120,000
Pulpwood	Cords	12,100	72,000
Staves, Slack	Number	5,635,000	51,000
Veneer Logs	Board Feet	2,050,000	41,000
Headings, Slack	Number	740,000	37,000
Other Products			150,000
TOTAL			\$8,823,000

The figures themselves necessarily represent wartime demand. For a more accurate picture of what might be regarded as normal production we need to go back to the year 1938, for which the figures are:

Commodity	Unit	Quantity	Value at Mill or Point of Production
Lumber	Board Feet	69,690,000	\$1,394,000
Fuelwood	Cords	476,000	1,428,000
Poles and Piling	Number	295,000	1,106,000
Farm Timbers	Board Feet	15,055,000	301,000
Fence Posts	Number	1,259,000	126,000
Holly Wreaths	Number	45,000	90,000
Holly, Loose	Crates	800,000	120,000
Mine Timbers	Number	1,567,000	63,000
Pulpwood	Cords	25,000	100,000
Staves, Slack	Number	4,269,000	22,000
Veneer Logs	Board Feet	1,332,000	20,000
Headings, Slack	Number	623,000	19,000
Other Products			100,000
TOTAL			\$4,889,000

Naturally, in the course of time, whether long or short, annual timber production in Maryland will level off. Indeed, it is more than doubtful whether figures such as those for the year 1941 could be long maintained without serious, even permanent, impairment of what forest capital the State now has. As to prices, the likelihood is that, in the

face of post-war demand, domestic and foreign, a very considerable time will elapse before these will recede, say, to the 1938 level. For this reason, the forest values given in this and the chapter which follows are decidedly on the conservative side.

Potential Value

The two really significant facts in relation to the potential value of Maryland forests are:

1. They produce today, on an average, only about one-fourth of the forest products consumed in the State.
2. Under proper management, their productive capacity could be stepped up eventually to a point where they would constitute the main source of supply for the State's timber requirements.

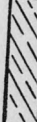
As to the first consideration, the following table shows for the years 1938, 1940, 1942, and 1944, the total lumber consumption in Maryland, as contrasted with the total cut of home-grown timber:

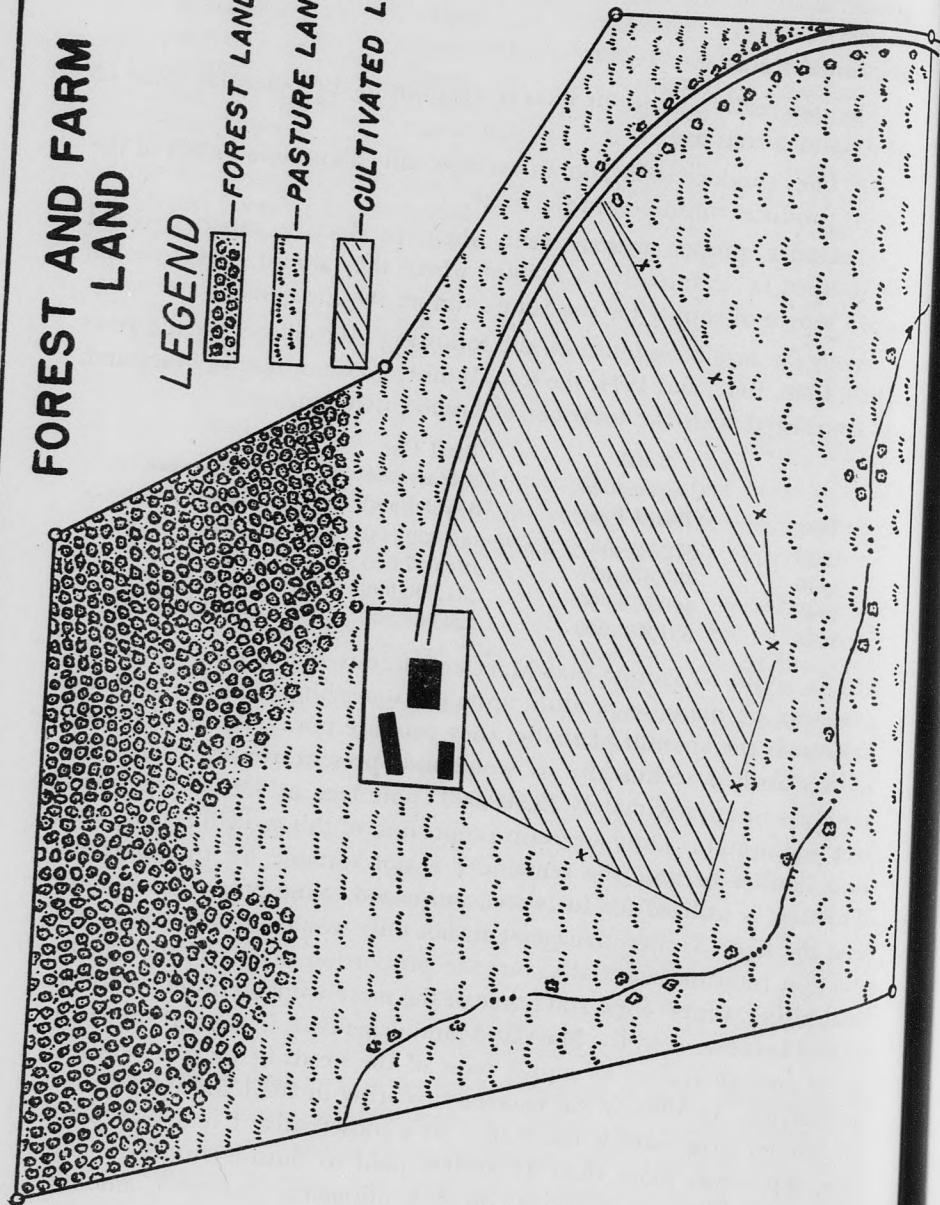
Year	Total Consumption (Board Feet)	Total Cut In Maryland (Board Feet)	Difference (Board Feet)
1938	272,825,000	69,690,000	— 203,135,000
1940	357,658,000	104,057,000	— 253,601,000
1942	400,576,000	131,000,000	— 269,576,000
1944	381,276,000	120,000,000	— 261,276,000

It is sound to assume that Maryland forests under proper management can be made to produce annually something like two and one-half times the amount of timber they produce now. On the 2,700,000 acres classified technically as woodland, present timber production amounts to approximately 72,500,000 cubic feet, or 435,000,000 board feet per annum. Only a certain proportion of this growth is converted into lumber because the remainder is not suitable for that purpose. This last is utilized for fuelwood, pulpwood, mine props, fence posts, and the like. Under management, not only would the volume of production increase materially, but the proportion of saw timber, poles, and piling, veneer logs, and other of the more valuable forest products would increase as well. Maryland landowners can in time, if they will, grow enough timber to supply most of the needs of local wood-using industries. In 1938, it was necessary to bring in 202,135,000 board feet of lumber from outside the State. At a conservative f. o. b. mill price, this represents more than \$4,500,000 paid to outside lumber manufacturers. The cost of freight on such shipments, moreover, amounts

FOREST AND FARM LAND

LEGEND

-  — FOREST LAND
-  — PASTURE LAND
-  — CULTIVATED LAND



to approximately \$3,000,000. Thus, normally, there is paid out each year, because Maryland forests continue unproductive, the high total of approximately \$7,500,000, most of which should stay at home.

Much of the lumber that is brought in from other states is in the form of construction material, either West Coast fir or southern pine. It will, of course, always be necessary to obtain certain grades and sizes of these woods, along with certain other special kinds, elsewhere than in Maryland. It is an interesting fact, however, that on the Eastern Shore there are large areas of loblolly pine, a relatively fast-growing tree especially adapted for construction purposes. All that is needed to provide much of the construction timbers required is to apply to these loblolly pine areas the principles of sound forest management.

Forest and Farm

On Maryland farms, woodlands aggregate some 1,142,000 acres, a very considerable proportion of the State's timbered area. Unfortunately, the average farmer has failed to realize the possibilities for steady profit represented by his timber, and as a result, it shows in most cases the effects of long neglect. Yet, aside from the money returns it can yield when properly managed, woodland, along with crop land and pasture land, holds an important place in farm economy. Many farms are on sloping or rolling land, and when the higher sections are covered with tree growth, soil erosion is checked effectively. It is difficult to exaggerate the importance of woodland in this respect. The accompanying diagram shows for a farm of 200 acres the relative proportions of crop land, pasture land, and timberland. What these proportions actually should be will depend, of course, upon the kind of farm—whether a dairy farm, a stock farm, or one devoted primarily to agricultural crops. In all cases, however, the area in timber should be of a size that will offer the necessary soil protection and at the same time enable the farmer to derive from it an appreciable supply of forest products.

No special equipment is required for farm woodlands. The essential thing is the proper selection of trees to be cut and the preservation of trees needed for seed purposes or for future use. The best wood-lot is one made up of trees of all ages—seedlings, saplings, poles and mature trees. Such a stand is produced by "selection cutting," that is, to cut each year only mature trees and those that need to be taken out to improve the quality and increase the rate of growth of the stand.



Pine Timber Stand Before Thinning.



Same Stand After Thinning.

Grazing animals should not be allowed in farm woodlands. They destroy young tree growth and, by constant trampling, so pack the soil that trees will not flourish. As compared with good pasture land, woodlands offer poor grazing, and cattle, for instance, are better off generally if kept out of wooded areas.

A typical owner of woodland in Maryland does not harvest his own timber. He lacks, in most cases, the necessary experience and equipment. Instead, he sells it on the stump to a sawmill operator, who logs the tract. Nor does the owner in most cases know much if anything about forestry and general market conditions. Accordingly, the Department of State Forests and Parks offers him a marking service to meet his practical requirements. Application for this service is made to the proper district forester, who assigns a technically trained assistant to examine the tract. As a result of this examination, the owner is furnished a written report, which lists the tree species, diameter classes, and other pertinent data, and recommends a plan of management. No charge is made for this service. Then, if the tract bears merchantable timber, the owner may have it marked for cutting by the expert who made the examination. This man must be furnished by the owner with two assistants. If these have had experience in the woods, from 20 to 40 acres can be covered in a day. No charge is made for marking which requires one day or less. In excess of this period there is a charge of \$15.00 per day to cover overhead.

When marking is completed, the owner is given a lump-sum estimate of the value of the marked trees at current prices. Each district forester has a complete list of sawmill operators in his territory, and the timber owner is furnished with a selected list of names from which he can, in all likelihood, secure bids. Since all trees are plainly marked, a prospective purchaser can see exactly what is offered for sale. The owner, at the same time, with the estimate of the value of the timber in his possession, is set to deal advantageously with buyers. The Department also will furnish the owner with a form of contract to provide for the conduct of a woods operation in a way to ensure protection of young growth from unnecessary damage.

Each year sees a steady increase in the number of requests received by the Department of State Forests and Parks from timber owners for its marking service. This is a clear indication of an aroused public interest in proper lumbering methods, and promises well for the future. (See also "Timber Cutting Practice," page 27).



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STATE FOREST ORGANIZATION

Matters in regard to forests and forestry in Maryland are handled by the Department of State Forests and Parks. In 1906, the Legislature made provision for a Board of Forestry (predecessor of the present Department) and for a State Forester. By this enactment, Maryland became one of the first states to recognize the importance of forestry in relation to the public welfare. In subsequent legislation, it has continued to adhere to this principle. (See "Cutting Practice Regulations," page 27, and "Forest Fire Control", page 29). Headquarters of the Department of State Forests and Parks is at Annapolis, Md.

For some year (1923 to 1941) the Department functioned under the Board of Regents of the University of Maryland. In 1941, the Legislature created the Board of Natural Resources, of which the Department is a coordinated agency. Other conservation agencies comprised in the Board of Natural Resources are the Department of Tidewater Fisheries, the Department of Game and Inland Fish, Department of Geology, Mines and Water Resources, and the Department of Research and Education.

The same legislation created a Commission of State Forests and Parks as the governing body for the Department of State Forests and Parks. In accordance with the law, this Commission of five members, appointed by the Governor, includes one member recommended by the State Grange and another by the Farm Bureau. A third member is some person engaged in the lumber industry, while the two remaining members are persons interested in forest conservation. (See also, "Cutting Practice Regulations," page 26).

To return now to the organization of the Department of State Forests and Parks: At the head of the Department is the Director. Chief administrative officer and fire control officer of the Department is the State Forester. An Assistant Director is in charge of timber management, and an Assistant Forester handles work in connection with the Roadside Tree Law and the Forest Conservancy Districts Act. For convenience in administration, the State is divided into four districts, with a district forester in charge of each. Under him are assistant district foresters and senior forest supervisors, each with an assigned field of work. The senior forest supervisors in turn oversee the work of a number of forest guards. Duties performed by the latter are described under "Forest Fire Control," page 29.

The Director, the State Forester, the Assistant Director, the Assistant Forester, the district foresters and assistant district foresters, must be graduates of an accredited forest school. These positions are filled through competitive State civil service examination. The remainder of the field personnel is classified under non-technical grades.

Supplementing the regular field force of the Department is an auxiliary body of between six and seven hundred forest wardens, commissioned by the Governor for renewable periods of two years. Most of these officers are on call in case of forest fires (Forest Fire Control, page 29. There is also a number of tree wardens, similarly commissioned (Protection of Roadside Trees," page 47). Many forest wardens have served for periods of from twenty to thirty years. Their services are given voluntarily, and since fighting a forest fire is an arduous and demanding work, they are properly numbered among our most public-spirited citizens.

BOARD OF NATURAL RESOURCES

The Department of State Forests and Parks, as previously indicated, is one of the component agencies comprised in the Maryland Board of Natural Resources, and for this reason it may not be amiss to describe here the purpose of the Board and the manner in which it functions. The following account has been prepared by Mr. William H. Bayliff, its Executive Secretary.

Maryland had, in 1941, a total of nine State agencies concerned either directly or indirectly with the conservation of our Natural Resources. Though their respective problems were often inter-related, each agency was wholly independent of any other, and went its way largely without reference to what was being done by other agencies. This in spite of the fact that the lines which divide the different natural resources are a product of the human mind; they are purely imaginary. For instance, the problem of protecting the fish in a stream can not be separated from the problem of protecting the water itself, the forests along the stream, or the soil in adjoining fields. In this matter the best opinion holds that, in the administration of our natural resources, we retain the usual conservation departments (though without a multiplicity of agencies), but we should provide for the correlation and integration of one department with another. As a prominent authority has expressed it: "One crying need of conservation in this country is an integrated conservation policy, which, while keeping the natural re-



A hardwood stand thinned in a way to obtain mature trees and at the same time to provide young growth for future timber crops.



No, this is not the wreckage left by fire. It is destruction wrought by clear cutting. This land, which once bore a thriving growth of timber, is now waste. No attempt was made by the operator to leave a healthy young growing stock of the more valuable tree species to form a future timber crop. He simply stripped the land and passed on, leaving ruin in his wake.

sources separated from each other administratively, provides a closely correlated policy for all."

In accordance with this broad principle, the Maryland General Assembly of 1941 reorganized the nine State conservation agencies previously mentioned into five equal and independent departments, as follows:

- Department of Tidewater Fisheries
- Department of Game and Inland Fish
- Department of State Forests and Parks
- Department of Geology, Mines and Water Resources
- Department of Research and Education

The law which organized these five conservation Departments also created the Board of Natural Resources which includes in its membership the Chairman of the Commission of Tidewater Fisheries, the Director of the Department of Game and Inland Fish, the Director of the Department of State Forests and Parks, the Director of the Department of Geology, Mines and Water Resources, and the Director of the Department of Research and Education. In addition to the five *ex officio* members, the Board also includes eight members appointed by the Governor, two from the Eastern Shore, two from the Western Shore, and four from the State at-large. The law designates the Chairman of the Commission of Tidewater Fisheries as Chairman of the Board and empowers the Board to employ an Executive Secretary and other clerical help.

This describes briefly the nature and composition of the Board of Natural Resources. It should be observed that an appreciable portion of its membership consists of Department heads, each of whom is trained in a special field and holds office under civil service rules of tenure. These *ex officio* members, therefore, form a permanent nucleus of the Board.

The Board was originally given no administrative authority and has subsequently sought none. It is simply a device for bringing the several conservation Departments together at regular intervals to discuss their common problems and to coordinate policies. At each meeting of the Board, Departmental lines are obliterated and the Departments merge into the Board itself, which thus becomes an agency ideally situated to secure an "integrated conservation policy" without hampering Departmental skill and competence. Moreover, the union of the several Departments in a single Board forms a united

conservation front against political pressures. The law, directly and by implication, charges the Board (1) to coordinate the activities of the several Departments associated with the Board, (2) to study the conservation problems of the State, (3) to report its findings, and (4) to make recommendations.

In its annual reports, which are available for free distribution, the Board takes stock of all the natural resources of the State, describes the policies under which these resources are administered, and recommends improvements or changes which will serve to protect, develop, or extend these resources.

REGULATION OF TIMBER CUTTING PRACTICE

Forest Conservancy Districts Act

To restore Maryland forests to full productiveness (See "Conditions," page 14), and to give them protection from fire, insects, and disease, the Legislature of 1943 passed what is known as the Forest Conservancy Districts Act, which authorizes the Commission of State Forests and Parks to establish regulations of forest practice on privately owned timberlands throughout the State, designed to ensure on such areas at all times a healthy young growing stock of the more valuable tree species, to prevent clear cutting except under certain prescribed conditions, to reduce fire danger, and to prevent "tree butchery" such as that practiced by operators in holly stands on the Eastern Shore and in Southern Maryland.

Regulations

Under the terms of the Act, the Commission has established six such regulations. Of these, four relate to cutting practices, while the remaining two are designed as measures of forest fire prevention, and are discussed under "Forest Fire Control," page 29.

Regulation 1 stipulates that in predominantly hardwood stands, the more valuable tree species shall not be cut below a specified diameter limit as determined by each county forestry board, subject, of course, to approval by the Commission. It also leaves to local boards determination of what are the more valuable tree species in any particular locality. Undesirable species may be cut to any diameter. In the case of approximately even-aged pine stands, such as are found on the Eastern Shore, the regulation provides that there be left, to ensure a second tree crop, not less than four seed trees per acre. The actual number of seed trees is left up to local boards. This regulation is designed to provide at all times an adequate growing stock of thrifty young trees of the more valuable species, and calls for nothing more than the practice ordinarily followed by timber owners who aim to keep their woodlands continuously productive. It is known as the selective system of cutting, under which mature saw timber is removed periodically, along with crooked, broken, stunted, fire-damaged, and other less promising trees, which are worked up into fuelwood, pulpwood, and other forest by-products.

Regulation 2 prohibits clear cutting except under certain prescribed conditions. Clear cutting means stripping the land of tree growth and leaving it open to fire and erosion. Only when the plan is to convert a clear cut area to farm crops or to buildings is the practice permissible.

Regulation 3 provides that any person or persons engaged in a raw forest products business, when such products come from within the State, shall register with the Department of State Forests and Parks and obtain a license to operate. Further details in regard to this regulation will be found on page 29.

Regulations 4 and 5, as has been said, deal with forest fire control, and are discussed under that head.

Regulation 6, applicable particularly to the Eastern Shore and Southern Maryland, provides that when holly is harvested, only a portion of the smaller branches shall be removed with a pruning shear or lopper. The use of saws, hatchets, or corn knives in holly stands is prohibited. This regulation is made necessary by the "tree butchery" practiced by dealers who, in late fall, invade holly stands, and who, if permitted to go unchecked, bid fair to destroy these stands, as has been the case along much of the eastern seaboard north of Maryland. Holly has been termed "green gold," and rightly so. On the Eastern Shore, for example, it brings to landowners an annual return of nearly one-half million dollars, and provides seasonal employment for as many as 10,000 persons, who are engaged mainly in making holly wreaths. Large quantities of "loose" holly, however, are shipped in crates to local and out-of-State markets.

It should be emphasized here that these regulations are not necessarily inflexible in all cases. Local conditions may make it advisable to modify one or more in certain respects, and local forestry boards are authorized to submit to the Commission, for its action, proposed changes in an existing regulation which, in the opinion of the board, will make for better administration in a particular locality. Before any regulation is put into effect by a local board, the law requires that a public hearing be held and that the regulation itself be published in local newspapers. This is in addition to approval by the Commission.

District Forestry Boards

A characteristic feature of the Forest Conservancy Districts Act—the one from which it derives its title—is the authority it gives the Commission of State Forests and Parks to appoint district forestry boards

of five members to implement the law and the regulations locally. District foresters act as secretaries of the boards. General administration of the law is placed with the Director of the Department of State Forests and Parks. In general, the policy of the Commission is to appoint a district board for each county. Exceptions may be made in the case of two adjacent counties with relatively scant forest cover. The make-up of a district forestry board is most important and should represent a cross-section of the community. Its individual members should be well-known and respected locally, and have a real interest in forest conservation.

Very definite ideas underlie the appointment of district boards. They are to bring the forestry law close to the people and to localize it; to enable those who administer the law to keep in close touch with public sentiment and public needs, thus to avoid any semblance of a distantly-based, unsympathetic central authority; to enable timber owners and others concerned to have their problems settled on the ground, without delay or red tape and, in short, to make the whole move a community matter, handled on a community basis.

Licenses For Forest Products Operators

Still another feature of the Forest Conservancy Districts Act is the provision that all forest products operators shall register annually with the Department of State Forests and Parks and take out a license. This includes sawmill operators and commercial dealers or operators in pulpwood, fuelwood, mine timbers, poles and piling, posts, veneer logs, cooperage stock, crossties, and the like. For such forest products operators, whether in or outside the State, the registration fee is \$10.00. Timber owners who cut from their own land forest products for domestic use or for the personal use of a neighbor, are not required to register with the Department.

FOREST FIRE CONTROL

Need For Control

Fire control is an integral part of forest management. It is, in fact, the thing that makes continuous timber production possible. To ensure continuous and profitable production of goods, great industrial plants take extreme precautions against fire. Safety engineers design and supervise the installation and operation of fire fighting

equipment, fixed and mobile, to provide maximum protection. Fire prevention rules are established and enforced. Little or nothing is left to chance. The owners wish to protect their investment, and this, so it seems to them, is the best way to do it.

In a very real sense, forests are nothing more or less than wood factories. As such, fire can destroy in a single day timber it takes management years to produce. Unlike an industrial plant, which can be rebuilt and resume operation in the space of months, the fire-scarred forest receives a set-back of indefinite duration. Repair must necessarily be slow, toilsome, and expensive. There is no alternative—no magic that will undo the damage overnight, or for a long time to come. Because this is so, the Department of State Forests and Parks is responsible under the law for the protection from fire of Maryland's 2,700,000 acres of woodland, public and private. This, necessarily, is a large assignment, and requires the bulk of the funds and the time of the greater part of the field personnel available to the Department, especially in the spring and fall when fires are most likely to occur.

State Fire Control Organization and Objectives

An effective system of forest fire control must provide for (1) fire prevention, which means public education in safety measures designed to ensure that the number of fires will be kept to the minimum; (2) quick detection, as exemplified by lookout towers; and (3) sufficient manpower, tools, modern pumpers and other equipment to meet any emergency.

Under the general direction of a designated officer, the forest fire organization of the Department begins at the headquarters office. In the field, fire control stems from the district foresters through senior forest supervisors, who oversee the activities of forest guards, towermen, and other field employees. Mechanics at central shops attend to the maintenance and repair of fire-fighting equipment.

Fire Prevention

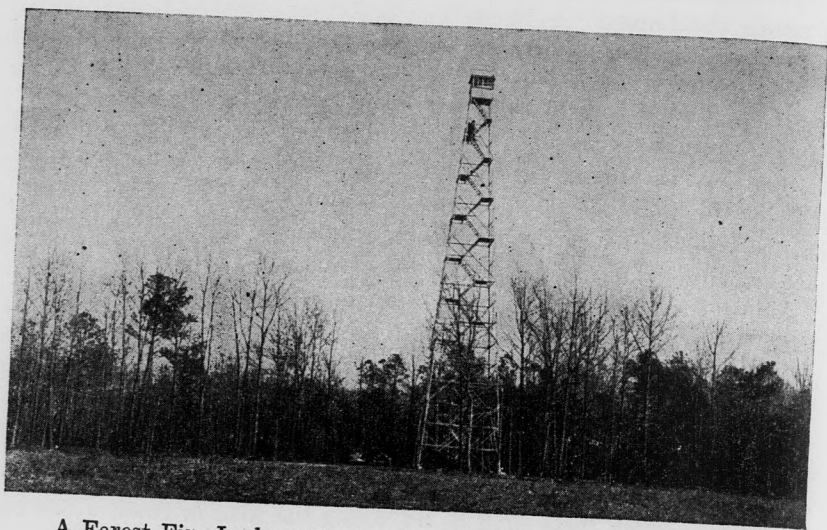
Hardly a rural landowner in Maryland is not familiar with the forest guard and his pumper truck, who calls, perhaps, to discuss safety measures to be taken when brush or other field trash is burned in the spring and fall, and to leave behind him some fire prevention literature for the landowner's perusal. Brush burning is responsible for many forest fires, especially when flames or sparks are permitted to escape to adjacent property. Yet this type of fire is one that may be

regarded as almost completely avoidable, provided the public is made to realize the danger.

Another factor calculated to eliminate the danger from brush burning is Regulation 4 of the Commission. This regulation, among other things, stipulates that in September, October, November, and December, and in March, April, and May, brush may be burned only between the hours of 4:00 P. M. and 12 midnight (EST), that is to say, during those hours of the day when wind and moisture conditions make burning safest. In the absence of natural barriers against the escape of fire, moreover, the landowner must plow a safety strip, free of all inflammable material, around the area to be burned, and to have on hand enough help with tools to cope with any emergency.

Regulation 5, as previously indicated, is another measure for fire prevention. It provides that in lumbering or other forest operations adjacent to public highways, except those used primarily for access to private properties, there shall be left along the road or roads a belt of timber 50 feet in width, from which may be removed only such trees as are marked by a representative of the Department of State Forests and Parks. Like Regulation 4, this is a public safety measure to provide a green barrier against fire between main-traveled highways and lumbered areas, with their highly inflammable slash. Mature saw-timber and trees dead, diseased, and otherwise defective, or those which may, for one reason or another, prove a danger to traffic, can and should be removed from such strips, and will be so marked. An incidental, but by no means unimportant, end to be attained by Regulation 5 is the preservation of roadside beauty, a most important asset for any State that aims to attract the outside tourist and to ensure its own people a pleasant place in which to live.

Fire prevention work, as carried on by the Department, does not stop with the activities of forest guards and regulations. Talks by district foresters before school, civic and farm organizations and sportsmen's clubs, distribution of special prevention posters for display in stores, restaurants, railroad stations, and other public places, and radio spot announcements on local stations, all play a part in the prevention campaign. So do press releases and special articles, prepared in the headquarters office, which urge care with fire in danger seasons. There is utilized, in fact, every available channel for the dissemination of warnings and advice calculated to keep fires at a minimum.



A Forest Fire Lookout Tower of which Maryland has thirty-two



View of Western Maryland Countryside

Fire Detection and Suppression

Next arises the need of spotting fires quickly and to reach them with men and equipment before they get an appreciable start. Eyes of the Department's fire control organization are its thirty-two lookout towers located at strategic points throughout the State. These are manned during the spring and fall danger seasons, and at such other times as a long spell of dry weather brings conditions favorable to fires.

To ensure quick control of fires that start, practically all towers in the central and eastern portions of the State are equipped with two-way radio, as are the cars of senior supervisors and forest guards. Thus, when a lookout spots a "smoke" he radios to the nearest forest guard the approximate location of the blaze. This man, in his pumper truck or car goes as quickly as he can to the scene. Once there, he radios back to the tower the exact location of the fire and the number of men and amount of equipment needed to control it. In most cases, the forest guard, possibly with the assistance of local help, is himself able to put out the fire. If not, he radios to the tower the information indicated, and the tower, in turn, relays it by radio to a dispatcher at district headquarters. The dispatcher then sends the necessary crews, tools, and other equipment to the scene of the fire. Radio communication between ground forces and towers, and between towers and dispatchers, represents the best system so far devised for the prompt control of fires.

Aside from its regular, highly trained field force, the Department, in actual fire fighting, leans heavily upon its more than six hundred forest wardens, commissioned by the Governor for renewable periods of two years. These men work only on call. Most of them are farmers, but the warden force includes besides, men engaged in such diverse occupations as store clerk, barber, electrician, bus driver, undertaker, carpenter, butcher, restaurateur, and liquor store proprietor. This goes to show the interest in forest fire control found in an extensive cross section of the population. A number of wardens have registered crews composed of friends and neighbors who sign up to go out on fires at the warden's call and are especially trained for this work.

A second line of defense in fire control is the Forest Fire Fighters Service. Originally set up by the Office of Civilian Defense, this organization is now in all respects a State activity. Membership is composed largely of high school boys, who are trained in groups by Departmental fire control personnel. Such groups have been called out on many fires, and their work is uniformly excellent.

Mention should be made of the invaluable service rendered by Maryland's volunteer fire companies in the suppression of woods fires and of field fires that threaten to spread to the woods. In the case of most companies, at least one member, usually the captain, is a commissioned forest warden, while the remaining members of the company are enrolled in the Forest Fire Fighters Service.

Water Holes

In the case of mobile pumper equipment, of which the Department has a number of units with tank capacity of from 50 to 1,000 gallons, reliance can not ordinarily be placed on natural sources of water supply. Much depends upon the location of a fire, which may very well be at a considerable distance from a stream or pond. To meet this situation, the Department has developed and will continue to develop a system of water holes to serve as rural fire plugs for its pumper units. A water hole consists of two four-foot lengths of concrete pipe, two feet in diameter, sunk into the ground to a depth of eight feet in selected locations where the ground water level is near the surface. Those so far established have served their purpose admirably. Plans call for the eventual development of some 1,500 water holes in the State.

Mobile pumper units, it should be said, seldom wholly extinguish a woods fire. Their chief function is to reach the fire quickly and to "cool it down," that is, confine it to its original size until the arrival of wardens and their crews, who completely surround the fire with a line or trench cleared to mineral soil. Only in this way is further spread of the fire certain to be prevented. Manpower and hand tools play an essential part in fire suppression. In flat country free of rock formations, fire lines may be cleared by the use of power-driven trenching machines, of which several types are on the market, but this is not practicable elsewhere at the present time.

Fire Weather Forecasts

It need hardly be said that weather conditions very largely determine the frequency and intensity of forest fires. To obtain a day-to-day knowledge of the weather as it relates to fire danger, the Department maintains the year round a number of stations at which, three times daily, are gathered data for fire weather forecasts. Such forecasts, as soon as made, are transmitted to the district foresters for their information and guidance in the field.

The nature of these reports is governed by four factors:

1. Number of days since the last $\frac{1}{2}$ inch rainfall.
2. Wind velocity.
3. Condition of forest fuels, whether green or dry.
4. Relative humidity.

To the extent that it is favorable for forest fires, the weather is placed in one of five categories or classes:

- Class I. Days on which it is raining or undoubtedly will rain.
Class II. Days on which fires will burn and spread very slowly.
Class III. Days on which fires will spread readily in dry brush, woods, or grass.
Class IV. Days on which fires will start easily, spread rapidly, and burn hot.
Class V. Days on which fires start easily and burn explosively.

On "bad" fire days, district foresters notify all fire control personnel to hold themselves in readiness for instant action.

Kinds of Forest Fires

1. *Surface Fires.* The most common type in Maryland. Such fires travel rapidly over the ground in leaves, litter, underbrush, and grass. They damage the larger trees and kill the young ones.

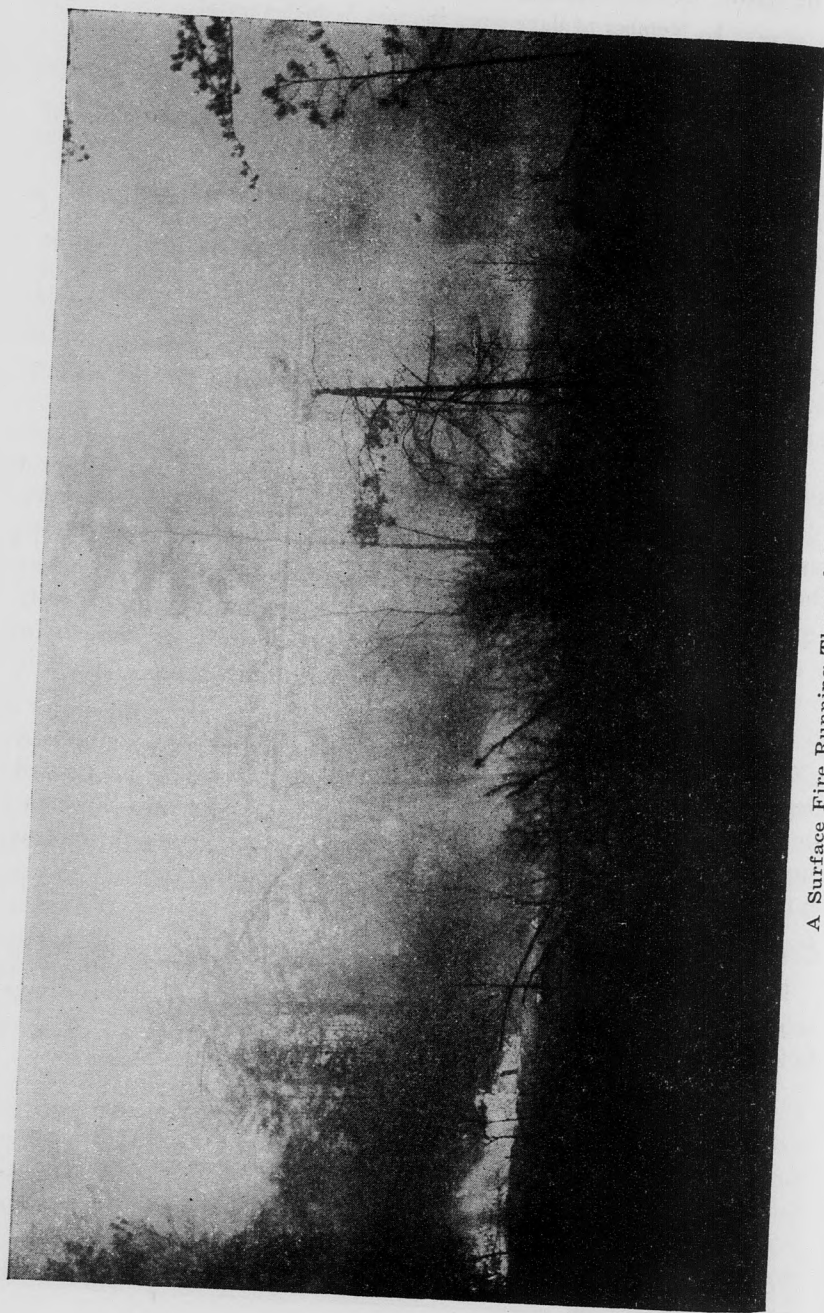
2. *Ground Fire.* These occur in muck soils when swamps dry out, or in deep forest duff in mountain areas. They burn slowly and tend to eat their way into the ground, especially in muck soils. They kill all trees and are difficult to extinguish.

3. *Crown Fires.* These travel fast through the tree tops, consuming everything in their path. The most dangerous and destructive type of fire. Rare in most parts of Maryland, but some bad ones have occurred in loblolly pine on the Eastern Shore and in scrub oak thickets in the mountains.

Causes of Forest Fires

The following tabulation shows the number of forest fires that occurred in Maryland in the calendar year 1944 and the various causes to which they were attributable.

Cause	Number
Lightning	1
Railroads	128
Campfires	10
Smokers	316
Brush Burning.....	173
Incendiary	32
Lumbering	4
Miscellaneous	52
Total	716



A Surface Fire Running Through Timberland.

It will be seen at once that the greatest source of forest fires in Maryland is the smoker, who in many cases, tosses lighted cigars cigarettes, or matches into dry underbrush, usually though not necessarily along the roadside, and goes his way.

As said elsewhere, brush burning formerly was responsible for about one-third of all fires in Maryland. Though there are still far too many brush fires, their number has, in the last few years, shown a steady decrease. Undoubtedly, this is the result of increased compliance with Regulation 4, and of a campaign of public education carried on by the Department through means already described. Since the greater number of forest fires is the result of carelessness, the matter of prevention must be continuously stressed. Education in this respect might very well start in the schoolroom.

TREE PLANTING

Trees may be planted for any one of several purposes. In the main, these are:

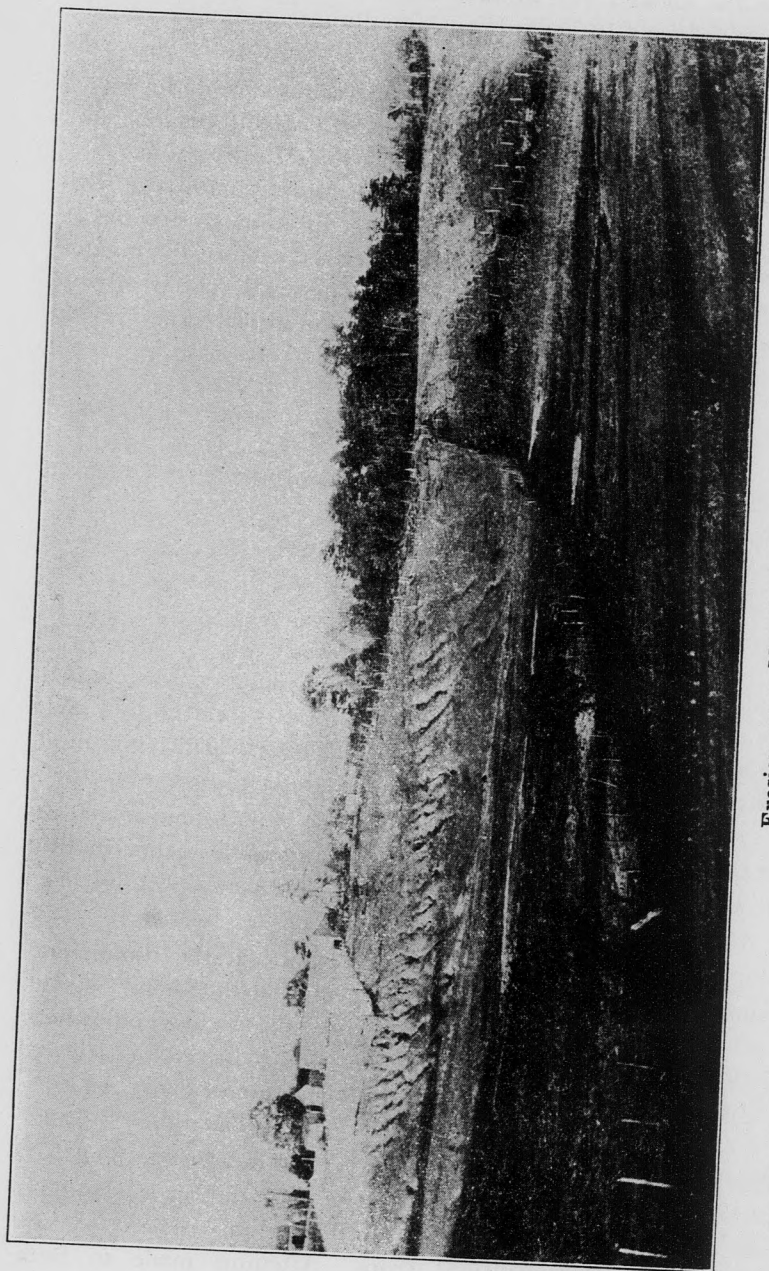
1. Commercial timber production.
2. Watershed protection.
3. Erosion control.
4. Roadside beautification.
5. To provide farm windbreaks.

As explained elsewhere in this manual, trees may also be planted for purposes such as the establishment of community forests or of living war memorials. Then there is, of course, ornamental planting around the country or suburban home, and along the streets of towns and cities.

Whoever plants a tree, for whatever purpose, does so, not alone for his own benefit, but for that of future generations as well. In this sense, it is an unselfish action in which anyone can rightfully take pride.

In Maryland, as a whole, tree planting aimed at the commercial production of timber has, until now, been negligible in extent. Several factors account for this. One is the disinclination of most landowners to embark on a long-term investment, the potentialities of which are either unknown to them or else not fully comprehended. Another factor is taxes, a subject discussed under "Forest Taxation".

Within the borders of Maryland today is an area of waste land estimated to total about 400,000 acres. Part of this land, in topography, soil, and drainage, has always been sub-marginal, that is to say, essentially unfit for agricultural crops. Attempts made to farm



Erosion on a Maryland Farm
 The fertile top soil has been washed away, and can not be replaced for generations, if ever. Antiquated farming methods are mainly responsible for erosion. One of the best conservation measures used in erosion control is tree cover.

such lands with profit, or to gain from them more than a bare subsistence, if that, invariably failed. The remainder of this waste land was, at the start, relatively fertile. Men made a living on it, and such crop surpluses as accrued went to swell the State's agricultural production. Then, the farming methods employed took their toll of topsoil, and in the end the land, sapped of fertility, was abandoned to big-scale erosion.

On such areas, as well as on those that were marginal at the start, certain amounts of tree growth have come in through natural reproduction. Some of this, however, is hardly better than scrub and is of no present or future value except as ground cover. None the less, as foresters classify land in technical terms, the area of woodland in the State has, over the past twenty-five years, increased though not to the same extent as farm land has decreased. In 1918, the Department estimated the State's wooded area at 2,223,000 acres, or 35 per cent of its total land area. Recent surveys place the wooded area at 2,700,000 acres or 42 per cent of the land area. The fact remains, however, that the great bulk of waste land is, to all intents and purposes, almost completely unproductive. There is also the further fact that such land is good only for tree crops. It will grow nothing else of value. Ours is the responsibility, then, to put this waste land to work—growing trees.

This bears directly upon the chances for profit in planted timber trees. As has previously been said, Maryland wood-using industries go outside the State for much of their raw materials. They do this not from choice, but from necessity since present timber production is insufficient to meet their needs. There exists in Maryland a permanent demand for lumber and other forest products that the consumers would prefer to obtain locally, to avoid excessive freight charges. The many new uses for wood developed in laboratories over the last decade further widen the field. The opportunity is there, provided the tree grower is permitted to establish his plantation and hold it to maturity without the imposition of costs, mainly in the shape of taxes, that can not well be other than a burden.

Tree planting for watershed protection has been carried out in Maryland mainly by municipalities and certain private water companies. The plantations on the Loch Raven watershed, near Baltimore, established some thirty years ago, are a case in point. A recent project of this kind is the planting done by the Washington Suburban Sanitary Commission on the watershed of the Patuxent River, in Howard

and Montgomery counties. On this area, approximately 400,000 trees have been set out so far. In watershed planting, evergreen trees are used almost exclusively, both on account of their relatively rapid growth and because they offer the minimum of foliage to blow into the water.

One object of a watershed plantation is, of course, erosion control. Considerable planting has also been done by individual owners and by Government agencies to control erosion on the farm. This subject is discussed in greater detail under "Forest and Farm."

The planting of individual trees or rows of trees along the roadside by abutting property owners and civic organizations is encouraged in every way by the Department of State Forests and Parks as part of its roadside beautification program. Activities of the Department under the Maryland Roadside Tree law are described on pages 47 to 49.

Farm windbreaks, usually consisting of two or more parallel, staggered rows of evergreen trees are not uncommon in Maryland, and invariably serve a useful purpose. This may be to prevent crop damage by high winds or to furnish protection for farm buildings. Most of our windbreakers serve the latter purpose. Since the initial cost is relatively small and the upkeep negligible, more of these might well be established in all parts of the State.

To ensure that tree stock is at all times available to landowners, the Department maintains a nursery where seedlings and transplants are raised both for field and for roadside planting. This stock is sold at cost. The Department distributes trees for roadside planting but not for ornamental use around homes as this is the field of commercial nurseries.

FOREST TAXATION

Maryland woodlands are subject to what is known as the general property tax. This is an annual tax levied against real property—lands, buildings, and the like. Outside of Baltimore City, county assessors place a valuation upon each piece of real property. County commissioners, in turn, fix a tax rate of so much per hundred dollars of assessed value. The property owner pays accordingly every year. For the landowner who raises wheat, or oats, or barley, or any other annual crop, this is no hardship. Each time his crop is harvested he obtains money with which to pay taxes since, annually, the soil pro-

vides him with the means to meet his obligations in this respect. Not so, however, with the timber owner. His wood crop—not otherwise different from other crops—may not be ready to harvest for twenty, thirty, forty years, or longer. Yet each year, without any return from his property, he must pay taxes on it. Sooner or later he feels the pinch. To ease the tax burden, he sells his timber, as yet immature, for whatever it will bring. Necessarily, it brings him relatively little. As a result, he becomes one more casualty in the ranks of those timber owners who are compelled to forego future profits under pressure of present needs. He loses what he might have gained. And the State, the final taxing authority, loses also. It loses in the elimination of a potential source of badly-needed mature timber. It loses again in the premature conversion of land valuable from the standpoint of taxes to land of little value in this respect. Many years will be required to make up the loss.

The same situation, of course, faces the landowner who sets out trees for commercial timber production. While these are in what may be termed the seedling stage, his tax assessment is likely to remain as it was. Let the trees reach a height, say, of six feet, and the chances are that his assessment will take a jump. And as the trees continue to increase in size, so will the assessed valuation of his land increase. Not only must he bear the capital cost of the plantation—perhaps \$10.00 per acre—he must also dig down into his pocket each year for taxes, and more taxes, on an investment that, as yet, brings him no return. Is it any wonder that the first time he receives an offer for this timber, no matter at what stage of its development, he accepts the chance to rid himself of what he has come to regard as a financial burden? Future profits, certain as these may be, are sacrificed to present needs.

Average Maryland woodlands, as determined by the character and condition of tree growth, are assessed at from \$5.00 to \$10.00 per acre. Some timber tracts carry an assessment of as much as \$35.00 or \$40.00 per acre. Nor is there any special uniformity among counties as to the basis of assessment. In recent years, moreover, the state-wide tendency has been to mark up assessments on timberlands. If continued, this will have a most detrimental effect upon the practice of forestry in the State. It means, in short, that our forest resources must be sacrificed, at whatever cost, to satisfy the tax gatherer.

To encourage Maryland woodland owners to hold their timber to maturity, there was introduced in the Legislature of 1945 a bill de-

signed to this end. In essence, this proposed legislation would permit owners of woodlands, upon certification by the Department, to register their tracts with the proper county tax authorities. Thereafter, such registered woodlands would be assessed at the uniform rate of \$1.00 per acre. In lieu of a general property tax, owners of registered woodlands would pay a yield tax of 10 per cent of the gross stumpage returns from the sale of forest products as and whenever made. Woodlands were defined in the bill as areas in excess of three acres which bear an unbroken ground cover of commercially valuable tree species, natural or planted, regardless of age. Forest products were designated to include lumber, pulpwood, fuelwood, mine timbers, poles and piling, posts, veneer logs, cooperage stock, crossties, pin bolts, copper poles, laurel, Christmas trees, and any other wood product or products taken from the land.

Woodlands registered under the terms of the proposed law could, upon proper notice to the Department, be withdrawn from registration at any time upon payment of accrued taxes at regular rates, plus interest, for the period the property had been carried as a registered tract. In the event that owners of such registered woodlands failed in any respect to carry out the provisions of the law, the Department was directed by the bill to file with the proper county tax authorities a notice of withdrawal, to ensure that thereafter the property would, for tax purposes, revert to its original status. The bill also provided that the Department might inspect registered woodlands as often as necessary, in order to determine whether the provision of the law are being carried out. Another stipulation in the bill was that registered woodlands should be closed to livestock. To accomplish this, the Department was authorized, when necessary, to require owners to fence their registered properties. Another stipulation was that boundaries of registered timber tracts be plainly marked, to permit of easy inspection by the Department.

Such were the principal features of the proposed law. It should be emphasized that registration of woodlands was wholly optional with the owner. No compulsion was involved. He could register it, or not, as he saw fit. It was for him to decide whether a property tax or a yield tax was to his best interest. The bill was passed by the House of Delegates of the Maryland legislature of 1945. The Senate, through its Finance Committee, referred the bill to the Legislative Council for further study. Until now—1949—the matter has gone no further.

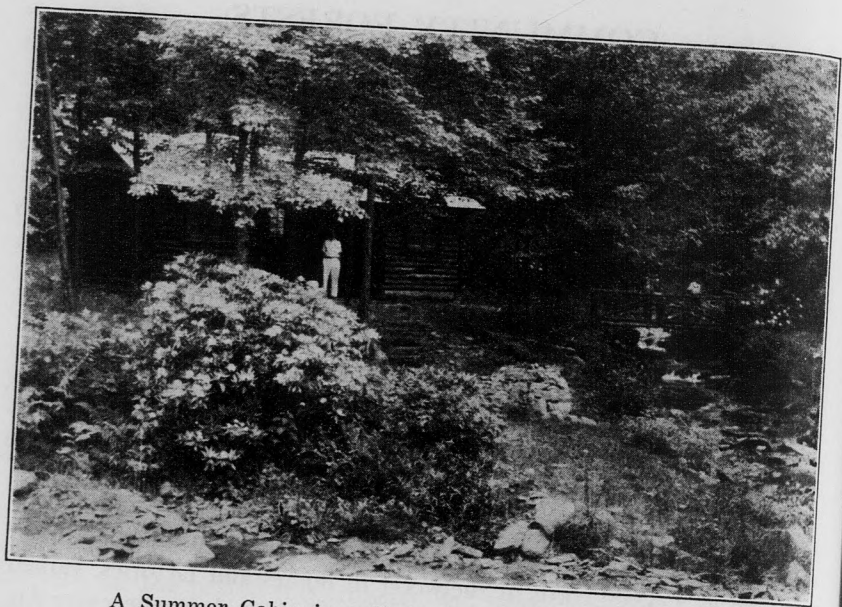
COMMUNITY FORESTS

It is hoped that the idea of a community forest will take root in Maryland. A community forest is an area of woodland or potential woodland, of whatever size, owned by a city, town, or other political sub-division, and operated primarily for timber production. It may, of course, provide added values in the control of soil erosion and stream flow, in wild life conservation, and in opportunities for public recreation. Such values, however, are incidental to the main object, namely, provision for a community supply of one or more forest products. Although fairly common in New England, community forests have not as yet been established in Maryland. The nearest approach is where municipalities, as mentioned elsewhere, own forests for the protection of their respective watersheds.

An account of the functions to be served by a community forest might very well start with the wood box. Sixty per cent of all American homes use wood for fuel. In Maryland there is consumed annually as much as 458,000 cords of fuelwood in homes and factories, valued at more than two million dollars. These figures show the every-day importance of wood for heating purposes. It should not be difficult to visualize the advantages of a community forest as a source of fuel supply.

Community forests may very well serve also as sources of supply for local wood-using industries. All over the Eastern States are towns, once prosperous, that began to decline when the local timber supply was cut out and their industries moved elsewhere. Many eventually became mere "ghost towns." It has happened here in Maryland and can happen again. In the circumstances, it would seem good business policy for a community with one or more wood-using industries to take stock of the future and to provide means to keep such industries running. The town storekeeper, the town banker, even the town undertaker, all have a stake in the matter. It is a truism to say that the time to prepare for good business is when business is good, not after it has declined.

There is also the matter of community taxation—more specifically, the taxes paid by individual members of the community. We shall have to pay for World War II for a long time to come—for how long it is impossible to say. Community forests can not, of course, help to reduce Federal taxes. But they can very well help to reduce local taxes. A single example of what a small community can do in this respect is the



A Summer Cabin in a State Forest Recreational Area.



Picnickers in a State Park



town of Russell, Mass., with a population of 1,283, and which owns a 3,000-acre forest. Estimated net profits from this forest should, in time, reduce the local tax rate by as much as 40 per cent.

Community forests are an old story in Europe. Many of them have been under management for hundreds of years. In not a few cases, the revenue they bring in is enough to meet all public expenditures. Here in America, the move for community forests has had a slow but steady growth. Today, some 1,600 communities in 30 states own more than 3,000,000 acres of forest land. Massachusetts alone boasts 126 community forests, on which have been planted upwards of 7,000,000 trees.

Maryland might, with profit, follow the example set by her New England sister state, the citizens of which traditionally are realistic and practical. In Maryland, as in Massachusetts, there are a number of communities that could profit by a steady supply for forest products. Why should not some of our nearly half-million acres of waste land be thus put to work?

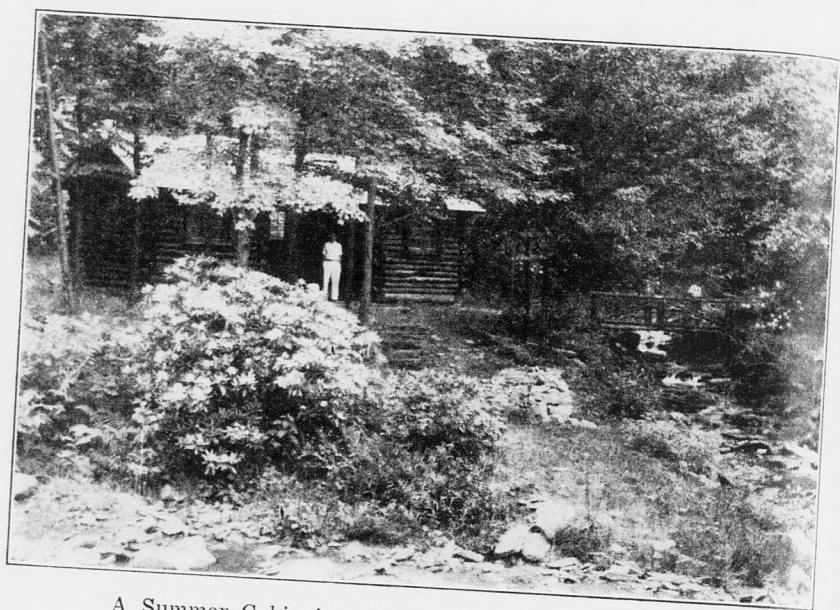
STATE FORESTS AND PARKS

State Forests



State Forests, along with State Parks, represent that portion of our timberlands in State ownership. Though they contain a number of recreational developments, the State Forests are intended primarily for timber production and watershed protection. In the first instance, they serve as demonstration areas to show, for the benefit of private woodland owners throughout the State, how to make and keep timberlands fully productive. In the second instance, State Forests comprise the watershed cover on considerable areas of the western Maryland uplands, where such cover is of first importance.

The nine State Forests (acquired in part by purchase, in part under a 99-year lease from the Government, and in part by gift) are located for the most part in Allegany and Garrett counties, with several areas on the Eastern Shore and in Southern Maryland. They total 119,182 acres. In so far as it goes, this represents progress in our public forestry program. A recent estimate by the Department, however, sets the proper balance between publicly owned and privately owned timberland at 1 to 5, which means, ultimately, not less than 400,000 acres of State Forests.



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Following are the respective names, locations, and areas of the State Forests, together with the number of visitors in 1947.

Name	County	Area	Number of
		Acres	Visitors
Potomac	Garrett	12,107	1947
Savage River	Garrett	51,473	21,610
Swallow Falls	Garrett	7,133	81,528
Mt. Nebo			52,160
(with Game Dept.)	Garrett		
Green Ridge	Allegany	1,791	
Cedarville	Charles-	25,391	30,071
	Prince George's		
Doncaster	Charles	3,509	12,760
Pocomoke	Worcester	1,464	437
Elk Neck	Cecil	12,553	12,839
		3,762	
Total		119,182	211,405

Beside the foregoing areas, a 125-acre tract on the Eastern Shore, the Seth Demonstration Area, is used, as its name implies, to demonstrate scientific forestry practice in loblolly pine.

Wood products obtained from timber operations designed to improve the stand on the State Forests, are sold on the open market. Under the law, 15 per cent of the revenue so obtained goes to the counties in which the respective State Forests are situated, in lieu of taxes. This fact may well be emphasized, since objection is occasionally made to the acquisition of additional land for State Forests, on the ground that it "takes these lands off the tax books." In fact, it does, for the State pays no taxes. As for revenue to the counties, however, it makes little or no material difference. In some instances, county revenue from the State Forests exceeds that which it would be possible to obtain were such lands in private ownership.

Two major recreational developments in the State Forests of Garrett County deserve mention. One is at Herrington Manor, in the Swallow Falls State Forest, adjacent to a 55-acre artificial lake, and the other is at New Germany, in the Savage River State Forest, bordering another artificial lake of about 10 acres. At Herrington Manor there are thirteen rustic cabins with accommodations for from two to six persons each, and at New Germany there are ten cabins of approximately the same capacity range. These cabins are rented to the public for maximum periods of two weeks. Hunting is permitted in the State Forests in season, and they are the favorite grounds for a great number of Maryland sportsmen.

State Parks

Of the five areas at present designated as State Parks, only three, the Patapsco, the Gambrill, and the Elk Neck, are parks in the true sense, that is, wooded areas of especial beauty. The other two Parks, Fort Frederick and Washington Monument, are, in reality, historic shrines which have been restored as permanent reminders of earlier days. Fort Frederick served pioneer settlers as a bulwark against attack in the French and Indian wars, while Washington Monument, erected by the citizens of Boonsboro in 1827, was probably the first such structure completed to honor the Father of his Country.

The location and respective areas of our State Parks, and the number of visitors in 1947, follow:

Name	County	Area Acres	Number of Visitors 1947
Fort Frederick	Washington	279	21,988
Washington Monument	Washington	45	69,821
Gambrill	Frederick	1,088	37,802
Patapsco	Baltimore-Howard	1,582	297,425
Elk Neck	Cecil	994	7,440
Total		3,988	434,476

Gathland Park on the Frederick-Washington County border at the Correspondents Monument consisting of one hundred and one (101) acres is being developed. The Bayside Park at Sandy Point, Anne Arundel County, seven hundred and twenty-five (725) acres, has been acquired and plans for recreational use are being drawn up.

In addition to the above, an area of 20 acres, known as Fort Tonoloway, in Washington county, has been donated to the State, and will eventually be developed for recreation. The Department of State Forests and Parks is also custodian for the famous Wye Oak in Talbot county. At the Elk Neck State Park there are nine summer cabins for public occupancy under conditions similar to those which obtain in the Herrington Manor and New Germany recreational areas. Elk Neck is the only state park with overnight accommodations.

The State Parks are intended solely for recreation, and hunting is not permitted.

PROTECTION OF ROADSIDE TREES

The preservation and protection of roadside trees in Maryland, as elsewhere, is a matter of wide public concern. Well-tended, shapely roadside trees are an asset to any state. They provide shade and lend

beauty to its highways, and in so doing make that State attractive to visitors, and a better place in which to live. And it is equally true that such trees, when improperly trimmed, take on the nature of an eyesore and a liability.

Roadside trees must be trimmed at intervals by public utilities, such as telephone, telegraph, and power companies, known collectively as "pole-line companies," whose overhead wires follow the routes of public highways. This is necessary in order that tree branches may not interfere with the lines and interrupt essential service. Something like 1,000,000 trees are thus trimmed in Maryland annually.

To ensure that such trimming shall be done under proper supervision, the Maryland Legislature, in 1914, enacted what is known as the Roadside Tree Law, which authorizes the Department of State Forests and Parks to establish regulations for, and oversee the trimming of, the State's approximately 3,000,000 roadside trees, whether by companies or by individuals. As defined by the law, roadside trees are "any which stand within the right-of-way of a public road, or between the curb or property lines of any street in an incorporated town."

All trimming of roadside trees is done under permit issued by the proper district forester. Pole-line companies are given blanket permits for *maintenance* trimming, by counties, good for the calendar year. Such trimming, however, is supervised by specially trained tree wardens, assigned to the work by the district forester. Trimming standards set up by the Department are designed principally to ensure preservation of the natural shape of a tree. No tree, moreover, may, as a general practice, be topped below a vertical height of 25 feet. Trimming work is regularly checked by a supervising tree warden, and two or three times a year by the district forester.

A new pole line calls for special procedure. After such a line is definitely located, the district forester assigns an inspector, in most cases himself, to accompany public utility engineers over the route of the new line to ensure, in advance, that there will be no unnecessary trimming or topping of trees. Often it is possible to move the positions of the wires or cross-arms to give greater clearance. At other times a pole may be moved one way or the other to correct some special difficulty. These preliminary surveys avoid future trouble.

When a permit is given for trimming a tree or trees, whether in the case of pole line companies or of individual owners, no authority is granted thereby for the removal of such tree or trees. That is an indi-

vidual matter between the owner or the pole line company and the Department. When in the course of ordinary maintenance work, or at any other time, a pole line company, for example, wishes to remove certain trees, it must apply for a permit to do so. Upon receipt of the application, the district forester designates an inspector, who may or not be the warden assigned to that particular maintenance job, to examine the trees in question and report. If the report favors removal, the district forester issues the necessary permit. Only in exceptional cases is permission given for the removal of healthy well-formed roadside trees. In all cases, such trees as are removed must be replaced by young trees of species suited to the site.

The whole matter of roadside trees in Maryland is summed up in the following extract from a manual issued by the Department of State Forests and Parks: "In the enforcement of the roadside tree law, the State authority extends over all trees within the rights-of-way of public thoroughfares. Where the road limits are held in fee by the public, whether in the name of the State, county, or incorporated town, this authority is absolute. Where the roadway is only an easement or right-of-way for road purposes, and the fee in the land is held by an abutting property owner, as is the case in most instances, such landowner has rights in the roadside trees on his property that must be respected by everyone, including the State itself. This right of the landowner, however, is secondary to that of the State, and can not be exercised without a State permit. Such trees, therefore, have double protection. Neither the State nor the landowner may trim or remove them, one without the consent of the other, nor can any corporation or individual trim or remove them without the consent of both the State and the property owner."

TREE EXPERT LAW

To protect the public from unskillful or unscrupulous "tree doctors," the Maryland legislature of 1945 enacted a bill (Sections 65-72, inclusive, Article 39 A of the Annotated Code of Maryland) which authorizes the Department of State Forests and Parks to certify as a tree expert any applicant who meets its requirements in this respect. Qualifications of an applicant for a certificate may be established in either one of two ways:

1. Through examination conducted by the Department or by its authorized agent.

2. In the case of an applicant who for at least five years immediately preceding his application has continuously been engaged in practice as a tree expert, through evaluation by the Department of his competency as such.

Should a candidate pass an examination satisfactory in all but a single subject, he may be re-examined in that one subject, and, if he passes this, he may be regarded as having passed the whole examination. A candidate who fails in more than one subject may, upon application, later be re-examined in all subjects. Applicants for the designation of Certified Tree Expert are required, when application is made, to pay to the Department a fee of \$10.00, and thereafter, if certified, one of \$5.00 annually. For a re-examination there is a fee of \$5.00. Under the law, the Department may permanently revoke or temporarily suspend any certificate issued to a tree expert found guilty of fraud or deceit in obtaining it, or of negligence or wrongful conduct in the practice of tree culture or care. In addition, the Department is authorized to establish rules of professional ethics, and to suspend for a period of not more than two years the certificate of any tree expert who violates them. In no case, however, may a certificate be revoked or suspended for any reason until the holder has been given the opportunity for a hearing.

In the matter of penalties for misrepresentation, the law reads: "If any person shall represent himself or herself to the public as having received a certificate . . . or shall assume to practice as a Certified Tree Expert without having received such certificate, or if any person having received such certificate shall thereafter lose the same by revocation or have the same suspended . . . and shall continue to practice as a Certified Tree Expert, or if any person shall use such title, or the abbreviation 'C. T. E.' or any other words, letters, or abbreviations tending to indicate that such person is a Certified Tree Expert without having received such certificate, or when such certificate has been revoked or suspended, such person shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be punished for each offense by a fine not exceeding five hundred dollars (\$500.00) or by imprisonment not exceeding six months, or by both fine and imprisonment in the discretion of the Court." The law then goes on to say that it is not the intention to prevent the tree owner from employing anyone other than a Certified Tree Expert but rather to make it unlawful for a person to represent himself as a Certified Tree Expert when he is not.

THE INDIVIDUAL TREE

Parts of a Tree

The three major parts of a tree are: (1) the crown or head, (2) the trunk or bole, and (3) the roots.

Crown — The crown or head of a tree consists of the branches, twigs, and foliage. The shape of the crown varies with different species, as does the method of branching. It is in the leaves, in the presence of sunlight, that the elaborated plant food (glucose) is manufactured.

Trunk — The chief functions of the trunk or bole of a tree are to support the crown, serve as a conductor of sap and plant nutrients, and as a storage place for elaborated food, gums, resins, etc. It consists of the bark, wood, and cambium.

The bark consists of an outer layer, for protection against heat, cold, insects, and disease; and an inner layer (phloem) which conducts the elaborated plant food from the leaves to the growing parts of the tree, that is, the buds, branches, trunk, and roots. Throughout the bark are very small openings known as lenticels or breathing pores through which air and water vapor may pass.

The wood is divided into two layers, sapwood and heartwood. The outer sapwood conducts the sap (soil nutrients) from the roots to the leaves, and is essential to the growth of the tree. The heartwood, usually of a darker color, is for mechanical support and for the storage of gums, resins, etc. It performs no vital function in the growth of the tree. At the center of the heartwood is the pith, a spongy mass of cells for the storage of elaborated food materials.

Extending from the center of the heartwood to the bark are *medullary rays*. These serve as food reservoirs, as well as to accelerate the radial movement of food materials to the cambium. In some species, i. e., the oaks, they are conspicuous, while in others, i. e., the willows, they can be seen only under a microscope.

The annual rings, readily visible on a cross-section of the trunk, are layers of wood added each year to the diameter of the stem as a result of cell division in the cambium. They represent periods of growth.

The cambium is located between the bark and the wood, and is composed of a thin layer of cells which divide and grow to form bark on the bark side and wood on the wood side. In spring and summer, when growth is active, the cambium cells are very tender, and the bark

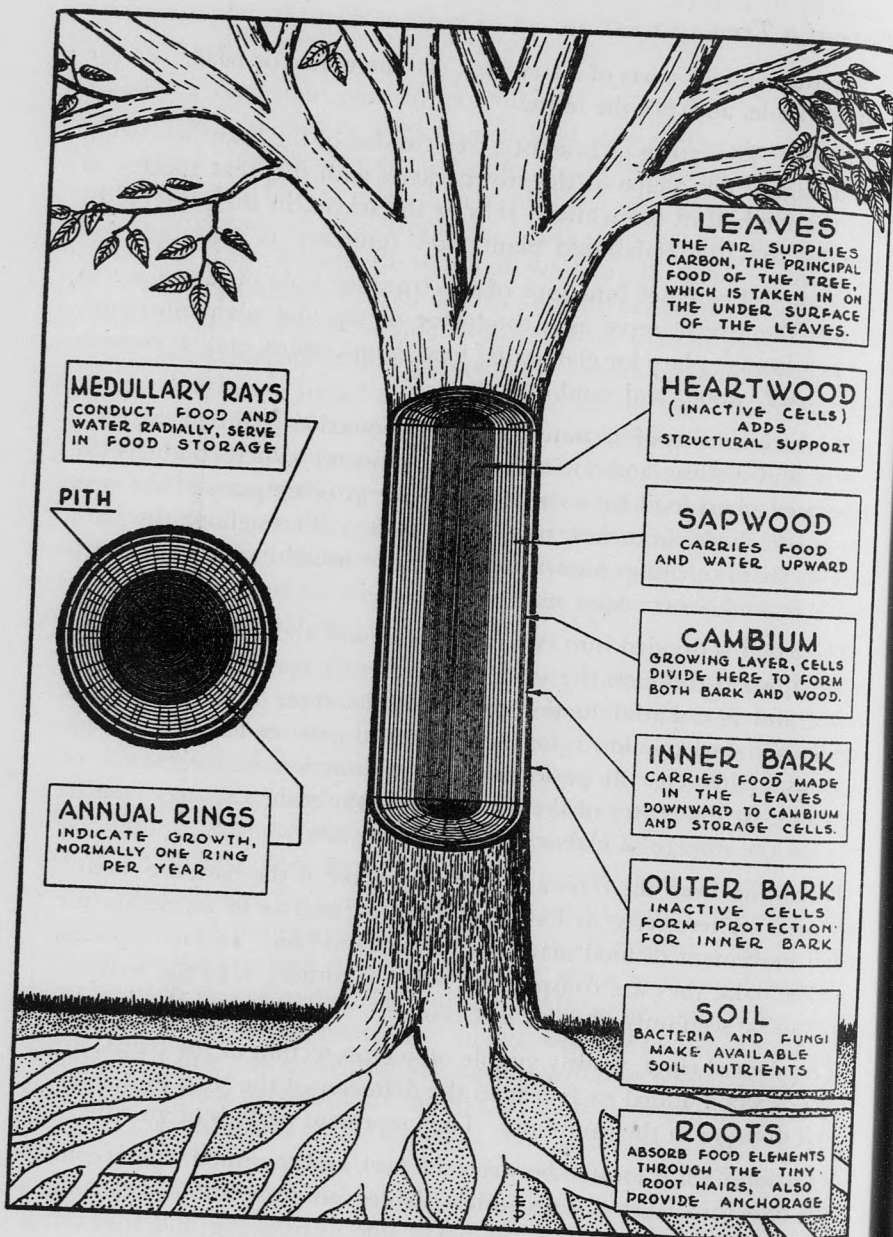


Diagram Showing Functions of Different Parts of a Tree

easily may be peeled from the tree. In winter, when the cambium is not active, the bark tightens up and is difficult to remove.

Roots — The functions of the roots are (1) to anchor the tree in the ground, and (2) to absorb water and nutrients from the soil. There are three general types of tree root systems: (1) taproot system, (2) intermediate system, and (3) lateral root system.

Trees with a taproot system have one of several large main roots which penetrate deeply into the soil. From such taproots the secondary roots extend at different soil levels. As might be expected, tap-rooted trees are the most wind-firm.

Among trees with a taproot system are:

- Bur Oak (*Quercus macrocarpa*)
- Butternut (*Juglans cinerea*)
- Black Walnut (*Juglans nigra*)
- Red Cedar (*Juniperus virginiana*)
- Hackberry (*Celtis occidentalis*)
- Loblolly Pine (*Pinus taeda*)
- Osage Orange (*Maclura pomifera*)
- Persimmon (*Diospyros virginiana*)
- Scarlet Oak (*Quercus coccinea*)
- Shagbark Hickory (*Carya ovata*)
- Tulip Tree (*Liriodendron tulipifera*)
- White Oak (*Quercus alba*)

The intermediate type of root system has wide-spreading and deep laterals. Among the trees with such roots are:

- American Elm (*Ulmus americana*)
- American Linden (*Tilia americana*)
- Planetree or Sycamore (*Platanus occidentalis*)
- Box Elder (*Acer negundo*)
- Green Ash (*Fraxinus pennsylvanica lanceolata*)
- Honey Locust (*Gleditsia triacanthos*)
- Horse Chestnut (*Aesculus hippocastanum*)
- Pin Oak (*Quercus palustris*)
- White Ash (*Fraxinus americana*)

Trees with a lateral root system have many large spreading roots from which smaller fibrous roots extend. Such a root system is comparatively flat and shallow. Trees which have it are the most subject to wind-throw.

Species with a shallow root system include:

- Beech (*Fagus grandifolia*)
- Sweet Gum (*Liquidambar styraciflua*)
- Black Gum (*Nyssa sylvatica*)

Black Locust (*Robinia pseudoacacia*)
Dogwood (*Cornus florida*)
Norway Maple (*Acer platanoides*)
Red Maple (*Acer rubrum*)
Scotch Pine (*Pinus sylvestris*)
Silver Maple (*Acer saccharinum*)
Sugar Maple (*Acer saccharum*)
Virginia Pine (*Pinus virginiana*)
White Pine (*Pinus strobus*)

Although the deep-rooted species may send some of their roots from ten to twenty feet below the surface of the soil, most trees have the greater part of their roots in the first two or three feet of soil.

How Trees Grow

Light, heat, moisture, and minerals are necessary for tree growth. The air supplies carbon, the principal food element of a tree, which is taken in through minute openings (stomata) in the leaves in the form of carbon dioxide gas, CO_2 . From the soil the roots absorb water. These elements are carried by the sap to the leaves and unite with carbon from the air to form glucose, a true plant food. All this is accomplished by the action of sunlight and heat on the green chlorophyll in the leaves.

Growth in a tree occurs in three places: (1) diameter growth of the trunk, branches and roots, (2) growth in length of twigs through development of terminal buds, and (3) growth at the root tips by cell division. Since, as said previously, growth in diameter is by division of cambium cells located between the bark and the wood, a tree will grow in diameter of trunk, branches and roots as long as it is alive.

Twigs originate as buds, of which there are four general types: (1) terminal (end), (2) lateral (side), (3) accessory, and (4) adventitious. Terminal buds are those at the apex of a stem or the end of a branch which requires only the elongation of the stem or branch to permit their full development. The growth in length of a twig results from the development of its terminal bud. Lateral buds are those of the axil of a leaf on the twigs or on the yearly stems of seedlings. When the terminal bud keeps in advance of the lateral buds, the result is a cone-shaped tree, such as the spruce. When the opposite is the case, the tree develops a broad, spreading form, like the elm. Accessory buds are merely a multiplication of the lateral bud, two or more in a cluster. It is seldom, however, that more than one develops; the others remain dormant. Adventitious buds may develop from almost any

part of a stem. They are responsible for the sprouts that grow from stumps.

Growth in length of all roots is the result of cell division near the tip or growing point of the root. At the extreme tip of the root is a small group of loose cells which form a protective cap for the delicate growing point. Near the end of the small roots are the root hairs or feeding roots. These are single cells which push out from the epidermis of the rootlets and appear like small tufts of white filaments. Root hairs are very important in the life and growth of a tree, for it is through them that the moisture and the food elements in solution are actually taken up from the soil. As a root tip grows, the tiny hairs thrust themselves in between the soil particles to absorb the dissolved plant food elements. The process is known as osmosis, which means the passage of a weak soil solution through the walls of the root hairs into the greater concentration of the cell sap.

TREES FOR BEAUTY

Trees are perhaps the most majestic and graceful of living things. Their beauty is the heritage of all — old and young, rich and poor. Many of those which resist the ravages of fire, soil starvation and disease, live to a great age. Some of the giant redwoods and sequoias of the Pacific Coast were sturdy trees long before the birth of Christ. Here in Maryland, many trees live for hundreds of years, and ever add to their beauty and impressiveness.

It is only necessary to consider the Wye Oak, at Wye Mills on the Eastern Shore, the largest and probably the oldest white oak in the United States, now in the ownership of the people of Maryland. Or the Lafayette Oak at Rising Sun, where the young French General, who came to America to help us fight for liberty, had his camp. Or the giant tulip poplar on the grounds of St. John's College, Annapolis, under which a treaty with the Susquehannock Indians was made. Or the group of English elms at Mt. Clare, the home of Charles Carroll of Carrollton. Whether on the lawn, by the roadside, or in the woods, trees make for a better place in which to live.

The first tree to put forth its bloom in the spring is the shad bush, or service berry. With its drooping white flowers, it may often be seen in late snowstorms of March or April. Next, the redbud, or Judas tree, with purplish flowers which crowd its branches be

fore the leaves come out. Practically at the same time appears the dogwood, its showy white flowers a fine sight in Maryland woodlands. Then follow the haw or wild crab apple, with its whitish to pink flowers. Then the wild cherry, with masses of white flowers, over the countryside and along roads. Not less beautiful is the tulip poplar with its yellowish red tulip-like flowers. Many more tree blooms add to the beauty of the Maryland picture in the spring, but these are the most profuse.

Hardly less impressive are the deciduous trees in winter, that is, trees that have shed their leaves. Their varying silhouettes against the background of the sky are worthy of all the study we can give them. It is only when a tree is bare of leaves that opportunity is afforded to study its individual structure, as contrasted with that of trees of other species with which it grows.

In spring and in summer, in fall and in winter, trees are things of rare and lasting loveliness—their varihued color, their shimmering delicate leaves, their grace of limb and twig, and their aesthetic form. Truly “only God can make a tree.”